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ROTATABLE CHILD SAFETY SEAT

5 **Cross-Reference to Related Application**

This application claims priority from U.S. provisional application serial number 60/442,163, filed on January 22, 2003 and entitled CHILD SAFETY SEAT, the content of which is incorporated herein in its entirety.

10 **Field of the Invention**

The present invention relates to child safety seats generally, and more particularly to a child safety seat mounting apparatus which provides a rotational capability of the seat while in a mounted and secured condition.

15 **Background of the Invention**

Infant and child vehicular safety seats have become widely available since legislation was passed in the United States making use of such safety seats mandatory in the automotive transportation of infants and small children.

20 The tremendous demand for vehicular safety seats has resulted in continual refinements and improvements to initial designs. Once such improvement is the adoption of standardized seat sizing for enhanced modularity and portability of such seats for use in applications outside

25 the automobile. For example, conventional infant vehicular safety seats typically are configured so as to be removably mountable to a base member that is secured in place in the respective vehicle via seat belts or other latch means, as well as to strollers and the like.

30 As a result, many presently-utilized vehicular safety seats incorporate a distinct base unit that is intended to remain securely positioned in the vehicle while the seat element may be selectively secured thereto. The seat

element itself, therefore, may be utilized as a child carrying apparatus, and used alone or in combination with mating base structures such as a vehicular base unit, a stroller, a shopping cart, or the like. Such a feature adds
5 significant utility to child safety seats.

Another feature that has been addressed in certain vehicular safety seat designs is that of a pivotable characteristic to the seat. In such a manner, the safety seat may be rotated while remaining in a secured
10 relationship within the vehicle. The user may therefore load and unload the child from the safety seat in a more convenient fashion.

The rotatable vehicular safety seats proposed to date, however, comprise relatively complex assemblies that are
15 expensive to manufacture. Typically, such assemblies require uniquely manufactured components to operate as designed. Moreover, such components fail to provide compatibility to conventional systems.

It is therefore a principle object of the present
20 invention to provide a vehicular child safety seat mounting apparatus that enables rotational mounting of a conventional child safety seat thereto.

It is another object of the present invention to provide a rotatable child safety seat mounting apparatus
25 that enables a conventional child safety seat to rotate along a plane parallel with its base while the seat is securely connected to the vehicle seats.

It is a further object of the present invention to provide a rotatable vehicular child safety seat mounting
30 apparatus that is compatible with conventional child safety seats.

It is a still further object of the present invention to provide a rotatable vehicular child safety seat mounting apparatus that is relatively inexpensive to manufacture.

Summary of the Invention

5 By means of the present invention, a rotatable vehicular child safety seat mounting apparatus is provided for operably receiving child safety seats thereto. The mounting apparatus of the present invention enables the mounting of a conventional child safety seat to a modified
10 base, which base provides a rotating and sliding utility to the child safety seat while the seat is in a secured relationship with the base. Such a sliding and rotating utility gives rise to more convenient access to the operably engaged child safety seat, so that child ingress and egress
15 to the safety seat is facilitated. The mounting apparatus is preferably configured for adaptation to conventional vehicular child safety seats.

In a particular embodiment of the present invention, the rotatable mounting apparatus includes a base structure
20 having an upper surface, a front end, a rear end, and opposing sides connecting the front and rear ends, with the base structure further including an elongated aperture extending therethrough from the upper surface to the lower surface. The aperture has a longitudinal axis extending
25 substantially parallel to the sides, and a lateral axis extending substantially parallel to the front and rear ends, with the longitudinal axis being relatively longer than the lateral axis. The base structure preferably further includes the first guide element disposed on the upper
30 surface thereof, as well as a releasable lock mechanism. The rotatable mounting apparatus preferably further includes an interface structure that is removably and rotatably

engagable with the base structure, with the interface structure having a mating element extending from a lower surface thereof, with the mating element being configured for operable, slidable, and rotatable engagement with the aperture in the base structure, thereby removably securing the interface structure to the base structure. The interface structure also includes a second guide structure on the lower surface thereof that is matingly engagable with the first guide element such that relative rotational motion between the interface structure and the base structure, while the first and second guide elements are operably engaged with one another, causes the interface structure to progressively displaced toward the front end of the base structure. The upper surface of the interface structure is preferably configured to operably and retainably receive the vehicular child safety seat thereto.

Brief Description of the Drawings

Figure 1 is a perspective view of the mounting apparatus of the present invention having a vehicular child safety seat operably engaged therewith.

Figure 2 is a perspective view of the assembly illustrated in Figure 1, with the child safety seat being rotated from a locked position while engaged with the mounting apparatus of the present invention.

Figure 3 is an isolation top perspective view of a base structure of the present invention.

Figure 4 is a bottom view of the base structure illustrated in Figure 3.

Figure 5 is an isolation top perspective view of an interface structure of the present invention.

Figure 6 is a bottom view of the interface structure illustrated in Figure 5.

Figure 7 is a top perspective view of the combination of an interface structure and a base structure of the present invention.

Figure 8 is a bottom view of the assembly illustrated in Figure 7.

Detailed Description of the Preferred Embodiments

The objects and advantages enumerated above together with other objects, features, and advances represented by the present invention will now be presented in terms of detailed embodiments described with reference to the attached drawing figures which are intended to be representative of various possible configurations of the invention. Other embodiments and aspects of the invention are recognized as being within the grasp of those having ordinary skill in the art.

Referring now by characters of reference to the drawings, and first to Figure 1, a child safety seat apparatus 10 is shown including a seat 12, a base portion 14, and an interface portion 16. Seat 12 is preferably removably secured to interface portion 16, while interface portion 16 is rotatably and slidably secured to base portion 14. Seat 12 may be a conventional child safety seat, which is capable of being removably mounted to interface portion 16.

Seat 12 may be a conventional infant or child vehicular safety seat with a standard configuration for a bottom portion thereof. Thus, interface portion 16 is preferably configured to be adaptable to conventional infant or child safety seats. In other embodiments, seat 12 may be specially designed for particular use with interface portion 16 of the present invention. In such embodiments, the bottom surface of seat 12 is preferably configured to

removably engage with interface portion 16. The present invention further contemplates the utilization of safety harnessing belts incorporated into the seat, and which are anchored to the mounting apparatus of the present invention.

5 The anchoring set up preferably includes means for automatically locking the safety harnessing belts upon the incursion of a predetermined degree of separation force between the child safety seat and the mounting apparatus.

As illustrated in Figure 2, seat 12, in operable
10 combination with interface portion 16, may be operably rotated on a plane parallel to lower surface 17 of interface portion 16. Such rotation enables the user to load and unload the child from seat 12 in a more convenient manner, and without having to detach seat 12 from its mounting base,
15 which, in the present invention, is the combination of interface portion 16 and base portion 14.

In preferred embodiments, seat 12 preferably includes a seat belt apparatus that is configured for operable engagement with appropriately configured receptacles in
20 interface portion 16. Such a seat belt apparatus is commonly incorporated into conventional child and infant safety seats.

An isolation perspective view of base portion 14 is illustrated in Figure 3. Base portion 14 is generally
25 defined by an upper surface 20, a front end 22, a rear end 24, and opposing sides 26, 28. Upper surface 20 of base portion 14 preferably includes an elongated aperture 34, which aperture 34 has a longitudinal axis "A" extending substantially parallel to sides 26, 28, and a lateral axis
30 "B" extending substantially parallel to front and rear ends 22, 24, respectively. Preferably, the dimension of longitudinal axis "A" is greater than lateral axis "B".

As further illustrated in Figure 3, upper surface 20 of base portion 14 preferably includes a first guide means 38 disposed thereon and preferably extending upwardly therefrom. Though first guide means 38 may be formed in a variety of configurations, a particular example contemplated by the present invention is that of a protrusion extending substantially perpendicularly upwardly from upper surface 20 of base portion 14. In the embodiments illustrated in Figure 3, first guide means 38 and elongated aperture 34 are formed along a central longitudinal axis of base portion 14. However, the present invention contemplates the relative positioning of aperture 34 and first guide means 38 in any of a variety of locations in base portion 14.

A bottom view of base portion 14 is illustrated in Figure 4, which shows a releasable lock mechanism 42 that is engageable in aperture 34. In a particular embodiment of the present invention, releasable lock mechanism 42 includes first and second lock arms 44, 48 that are pivotably mounted about respective pivot points 50, 52, which pivot points 50, 52 provide for pivoting motion of first and second lock arms 44, 48 along a plane substantially parallel to lower surface 21 of base portion 14. Preferably, pivot points 50, 52 comprises threaded rods, bushings, or the like that define respective axes of rotation for first and second lock arms 44, 48.

As shown in Figure 4, first and second lock arms 44, 48 each include distal ends 54, 56 that are operably urged into contact with one another by biasing means 60, which are configured to deliver bias force to the respective first and second lock arms 44, 48 via respective coupling bodies 62, 64 of manual release unit 68. At the behest of biasing means 60, respective coupling bodies 62, 64 are operably

promoted to direct respective first and second lock arms 44, 48 in a direction toward rear end 24 of base portion 14. Since first and second lock arms 44, 48 are anchored to base portion 14 at respective pivot points 50, 52, biasing motion
5 transmitted to first and second lock arms 44, 48 via coupling bodies 62, 64 results in a pivoting of respective lock arms 44, 48 about pivot points 50, 52. Accordingly, respective distal ends 54, 56 of first and second lock arms 44, 48 are naturally urged by biasing means 60 toward one
10 another and ultimately into contact with one another. To assist in facilitating substantially planar pivoting about respective pivot points 50, 52 by first and second lock arms 44, 48, respective position retainers 72, 74 may be provided in the present invention. Such position retainers 72, 74
15 each include bushings, washers, or the like that are specifically positioned and secured in place by a vertical post such as a threaded screw or the like to thereby retain respective first and second lock arms 44, 48 in a desired level orientation. To accommodate position retainers 72,
20 74, first and second lock arms 44, 48 preferably include positional slots 76, 78 respectively disposed therein. As a result, first and second lock arms 44, 48 are maintained in a desired positional relationship with position retainers 72, 74 through respective positional slots 76, 78.

25 In order to effectuate pivotal motion of first and second lock arms 44, 48, biasing means 60 must be manually compressed so as to promote motion of coupling bodies 62, 64 in a direction toward front end 22 of base portion 14. Manual release unit 68 includes an actuator 69 that is
30 coupled to a platform portion 70 thereof through a slot in front end 22 of base portion 14. Platform portion 70 is preferably configured to apply compressive forces to biasing

means 60 upon actuation of actuator 69. In a particular embodiment, actuator 69 is a handle that may be pulled outwardly from base portion 14 by a user, which pulling action correspondingly moves platform portion 70 in a direction toward front end 22 of base portion 14, thereby compressing biasing means 60 so as to cause pivoting motion to first and second lock arms 44, 48. Such pivoting of first and second lock arms 44, 48 moves respective distal ends 54, 56 thereof away from one another, thereby releasing the lock established when distal end 54, 56 of first and second lock arms 44, 48 are in contact with one another.

The present invention contemplates a number of configurational variants to releasable lock apparatus 42, so long as such an apparatus provides a similar functionality to that described above. For example, releasable lock apparatus 42 may include only a single pivoting lock arm that extends across lateral axis "B" of aperture 34 when in a fully biased orientation.

A perspective top view of interface portion 16 is illustrated in Figure 5. Upper surface 112 of interface portion 16 is preferably specifically configured to matingly engage with conventional vehicular child safety seats in either a forward or rearwardly-facing orientation. For example, intermediate ridge 114 disposed on upper surface 112 is configured to operably receive a clamping portion provided on the bottom sides of conventional vehicular child safety seats. Thus, interface portion 16 acts as a universal receiving platform upon which conventional child safety seats may be operably secured.

A bottom view of interface portion 16 is shown in Figure 6 having a mating protrusion 122 extending from lower surface 114 of interface portion 16. Mating protrusion 122

is preferably sized and configured to operably engage with aperture 34 by extending therein when interface portion 16 is aligned in superimposed and adjacent relationship with base portion 14. As so aligned, mating protrusion 122 is
5 configured for slidable and rotatable engagement with aperture 34. Accordingly, the diameter of mating protrusion 122 is similar to, but slightly smaller than, lateral axis "B" of aperture 34. Thus, mating protrusion 122 only has freedom to move along longitudinal axis "A", as well as the
10 freedom to rotate within aperture 34 when not locked in place by locking mechanism 42.

Lower surface 114 of interface portion 16 further includes a second guide utility in the form of channel 128 that is configured to matingly engage with first guide means
15 38 on upper surface 20 of base portion 14. When first guide means 38 is in an engaged relationship within channel 128, rotation of interface portion 16 with respect to base portion 14 causes first guide means 38 to travel within channel 128. Preferably, rotational motion between
20 interface portion 16 and base portion 14, while in an engaged relationship, causes interface portion 16 to progressively displace toward front end 22 of base portion 14. Such displacement is a direct consequence of the two-dimensional parabolic shape of channel 128.

25 Figures 7 and 8 illustrate a top view and a bottom view, respectively, of interface portion 16 in engaged relationship with base portion 14. With reference to Figures 6-8, the operational relationship between interface portion 16 and base portion 14 will now be described. A
30 detachable flanged or cap member 130 is preferably removably securable to distal end 123 of mating protrusion 122, with flanged member 130 having a diameter that is larger than

lateral axis "B" of aperture 34. In such a manner, flanged member 130 may selectively be secured to mating protrusion 122 from the underside of base portion 14 such that flanged member 130 retains interface portion 16 in juxtaposition with base portion 14 by operably contacting lower surface 21 of base portion 14. Even with flanged member 130 being secured to mating protrusion 122, interface portion 16 remains rotatably and slidably coupled to base portion 14. So long as flanged member 130 is selectively secured to distal end 123 of mating protrusion 122, interface portion 16 is held in adjacent engagement with base portion 14.

With flanged member 130 secured to mating protrusion 122, interface portion 16 is positioned with respect to base portion 14 as is shown in Figures 7-8. With releasable lock mechanism 42 being in a fully biased orientation, or locked position, respective distal ends 54, 56 of lock arms 44, 48 bear against mating protrusion 122 and retainably secure mating protrusion 122 between lock arms 44, 48 and rear end 35 of aperture 34. This relative orientation between interface portion 16 and base portion 14 is a "locked" position. Releasable lock mechanism 42 acts to retain the locked position of interface portion 16 on base portion 14 through the configuration of first and second lock arms 44, 48, in that force imparted on distal ends 54, 56 thereof by mating protrusion 122 acts to increase the closing pressure asserted at distal ends 54, 56 of first and second lock arms 44, 48. Specifically, respective distal ends 54, 56 are tapered so that force directed in a direction toward front end 22 of base portion 14 enhances a rotational force generated by biasing means 60 in a locking or closing direction. Accordingly, mating protrusion 122 is maintained

in a locked position so long as releasable locking mechanism 42 is not released through the actuation of handle 69.

In addition to the above, the relationship between first guide means 38 and channel 128 is such that when
5 interface portion 16 is in the locked position, first guide means 38 is disposed at a front end 131 of radial portion 132 of channel 128. Accordingly, the lateral walls of channel 128 at end 131 enclose first guide means 38 on three sides, thereby preventing rotational movement of interface
10 portion 16 with respect to base portion 14. The locked position, therefore, retains interface portion 16 in a stationary and fixed relationship with base portion 14.

When handle 69 is actuated to thereby retract biasing means 60 and correspondingly to pivot first and second lock
15 arms 44, 48 out from aperture 34, mating protrusion 122 becomes free to slidably move within aperture 34 toward front end 22 of base portion 14. To enable the rotational capability of the present invention, interface portion 16 is slid forward with respect to base portion 14, such that
20 mating protrusion 122 slidably moves within aperture 34 toward front end 36 of aperture 34. In addition, first guide means 38 correspondingly moves along radial portion 132 of channel 128 toward apex 134. Once first guide means 38 is moved to a position corresponding to apex 134 of
25 channel 128, rotation of interface portion 16 with respect to base portion 14 may be accomplished, as first guide means 38 selectively slidably moves toward one of distal ends 136, 138 of channel 128. Since the above described movement is accomplished between interface portion 16 and base portion
30 14 while engaged through flanged member 130, the child safety seat need not be removed from interface portion 16 during the sliding and rotating procedures. Accordingly,

the child is transported in the safety seat while interface portion 16 is in a locked position with respect to base portion 14, with such a locked position being selectively deactivated through actuation of handle 69 such that
5 interface portion 16, with the child safety seat securely attached thereto, may be rotated into a position convenient for egress and ingress to the seat.

As is illustrated in Figure 6, channel 128 is preferably configured in a substantially parabolic shape
10 such that rotation of interface portion 16 with respect to base portion 14 causes the corner of interface portion 16 nearest to the automobile seat during such rotation to correspondingly displace forwardly so as to prevent interference between the attached child safety seat and the
15 vehicle seat.

A variety of configurations for channel 128 are contemplated by the present invention, with the parabolic shape illustrated in Figure 6 being a preferred example for desirably guiding interface portion 16 along with the
20 attached child safety seat during rotation of the child seat with respect to base portion 14. As noted above, the lock/unlock and sliding and rotational procedures are particularly useful when the child safety seat is maintained in a secured engaged relationship with interface portion 16.
25 However, such motions and permutations may be performed without the child safety seat being engaged with interface portion 16, as desired.

The above-describe elements of the present invention are preferably manufactured from lightweight and durable
30 materials that are accepted by governmental safety standards for infant and child vehicular safety seat mounting devices. In some embodiments of the invention, interface portion 16

and base portion 14 are fabricated from polymeric materials such as ABS or high-density polypropylene.

An additional feature of the present invention is illustrated in Figures 7, 7A and 8, which show safety retention device 152 being mounted through respective apertures in base portion 14, and extending upwardly from upper surface 20 thereof. Safety retention device 152 preferably includes a base member 154 that operably mounts to lower surface 21 of base portion 14, and safety retention portion 156 extending substantially horizontally from upstanding portion 158 of safety retention device 152. Retention portion 156 is preferably configured and spaced from upper surface 20 of base portion 14 so as to operably grasp interface portion 16 between upper surface of base portion 14 and retention portion 156. In such a manner, safety retention device 152 acts to further operably retain interface portion 16 in a secure adjacent relationship with base portion 14. In particular, safety retention device 152 preferably assists in clamping the rear end of interface portion 16 down to base portion 14, and prevents undesired lifting or disengagement of interface portion 16 from base portion 14 in the event of a substantial lifting force upon interface portion 16, such as in the event of a vehicular accident wherein the weight of the child safety seat carries sufficient momentum so as to act to lift interface portion 16 from base portion 14. Since base portion 14 is securely held in place to the vehicle seats via seat belt anchors and the like, safety retention device 152 preferably retains interface portion 16 in a desired engaged relationship with base portion 14, even in the event of a relatively large disengaging force applied. In some embodiments of the present invention, safety retention

device 152 is integrally formed with base portion 14. Preferably, safety retention device 152 is fabricated from a very strong material such as steel or the like, so that disengaging forces upon interface portion 16 will not result in breakage of safety retention device 152.

A still further aspect of the present invention is illustrated in Figures 5 and 7, which show harnessing means 172 extending upwardly from interface portion 16, with such harnessing means 172 each including at least one tie aperture 174 disposed therethrough and in a portion thereof above upper surface 112 of interface portion 16. Such harnessing means 172 are preferably mounted at lower surface 114 of interface portion 16, and are utilized to receive one or more tie straps (not shown) for operably anchoring items such as the child safety seat to interface portion 16. In some embodiments of the present invention, harnessing means 172 are integrally formed with interface portion 16 and extend upwardly from upper surface 112 thereof. Harnessing means 172 are preferably fabricated from a strong material such as steel or the like.

The invention has been described herein in considerable detail in order to comply with the patent statutes, and to provide those skilled in the art with the information needed to apply the novel principles and to construct and use embodiments of the invention as required. However, it is to be understood that the invention can be carried out by specifically different devices and that various modifications can be accomplished without departing from the scope of the invention itself.